WHAT IS CLAIMED IS:

1. A mesostructured material having tubular mesopores, the mesostructured material being arranged on a polymeric surface constituted of a polymeric compound, wherein the tubular mesopores are oriented towards a first direction parallel to the surface.

2. The mesostructured material according to claim 1 containing silicon.

3. The mesostructured material according to claim 1 or 2, wherein polymer chains of the polymeric compound are oriented towards a second direction parallel to the surface.

4. The mesostructured material according to claim 3, wherein the first direction and the second direction are different from each other.

5. The mesostructured material according to claim 4, wherein the first direction and the second direction are substantially orthogonal each other.

6. The mesostructured material according to claim 3, wherein the polymeric surface is constituted of a Langmuir-Blodgett film.

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7. The mesostructured material according to claim 1, wherein the polymeric surface has been rubbed in a prescribed direction.

8. The mesostructured material according to claim 7, wherein the prescribed direction is the same direction as the first direction.

9. The mesostructured material according to claim 1, wherein the polymeric surface contains at least one polymer selected from the group consisting of polyethylene, nylon, polybutylene terephthalate, polyethylene terephthalate, polyester, polyimide and parylene polyparaxylilene.

10. The mesostructured material according to claim 9, wherein the polymeric surface contains polyimide.

11. The mesostructured material according to claim 1, wherein the polymeric surface is constituted of a polymeric film arranged on a substrate, and the mesostructured material is formed on a free surface of the polymeric film.

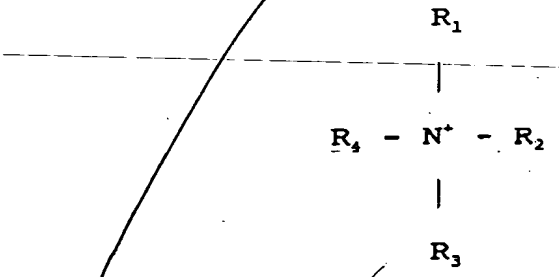
12. The mesostructured material according to claim 11, wherein the substrate material is made of a glass.

13. A mesostructured silica arranged on a polymer material surface, in which chains of the polymer material are oriented to a first direction parallel to the polymer material surface, having tubular mesopores, wherein the tubular mesopores are oriented to a second direction nearly perpendicular to the first direction, and the oriented tubular mesopores are formed on the polymer material surface by locating silica outside of an oriented rod-like surfactant micelle structure of which orientation is determined by parallel accommodation of molecules of the surfactant on the chains of the polymer material through chemical interaction.

14. The mesostructured silica according to claim 13, wherein the surfactant is a cationic surfactant or nonionic surfactant.

15. The mesostructured silica according to claim 14, wherein the cationic surfactant is a quaternary alkylammonium salt.

16. The mesostructured silica according to claim 15, wherein the quaternary alkylammonium is represented by the following structural formula:



wherein R_1 to R_3 are independently a methyl group or ethyl group and R_4 is a C10 to C18 straight chained alkyl group.

17. The mesostructured silica according to claim 16, wherein the R_4 is a C12 to C16 straight chained alkyl group.

18. The mesostructured silica according to claim 14, wherein the nonionic surfactant is an alkylamine or a surfactant containing polyethylene oxide as a hydrophilic group.

19. The mesostructured silica according to claim 13, wherein the polymer material surface is comprised of a Langmuir-Blodgett film.

20. The mesostructured silica according to claim 13, wherein the polymer material is at least one

polymer selected from the group consisting of polyethylene, nylon, polybutylene terephthalate, polyethylene terephthalate, polyester, polyimide and parylene polyparaxylilene.

21. The mesostructured silica according to claim 20, wherein the polymer material is polyimide.

22. The mesostructured silica according to claim 13, wherein the mesopores are hollow.

23. The mesostructured materials according to claim 13, wherein the polymer material surface is constituted of a film of the polymer material, the film being arranged on a substrate, and the substrate is made of silicon oxide.

24. A process for forming a mesostructured material having tubular mesopores comprising steps of:

(i) providing a polymeric surface subjected to an alignment control treatment; and

(ii) bringing the polymeric surface into contact with a solution containing a surfactant and an alkoxide, hydrolyzing the alkoxide and forming the mesostructured material on the surface.

25. The process according to claim 24, wherein the step (i) comprises the sub-step of rubbing a polymeric surface as the alignment control treatment.

26. The process according to claim 24, wherein the step (i) comprises a sub-step of providing a polymeric surface constituted of a Langmuir-Blodgett film.

27. The process according to any one of claims 24 to 26, wherein the step (ii) includes a step of immersing the polymeric surface into the solution.

28. The process according to any one of claims 24 to 26, wherein the polymeric surface contains at least one polymer selected from the group consisting of polyethylene, nylon, polybutylene terephthalate, polyethylene terephthalate, polyester, polyimide and parylene polyparaxylilene.

29. The process according to claim 28, wherein the polymeric surface contains polyimide.

30. The process according to claim 24, further comprising a step of removing the surfactant within the mesopores and hollowing the mesopores.

31. The process according to claim 30, wherein the step of removing the surfactant within the mesopores includes calcining the mesostructured material resulting from the step (ii).

32. The process according to claim 30, wherein the step of removing the surfactant within the mesopores includes extracting the surfactant within the mesopores with a solvent from the mesostructured material resulting from the step (ii).

33. The process according to claim 30, wherein the step of removing the surfactant within the mesopores includes extracting the surfactant within the mesopores with a critical fluid from the mesostructured material resulting from the step (ii).

34. A process for forming a mesostructured silica having tubular mesopores comprising the steps of:

(i) providing a polymer material surface in which chains of the polymer material are oriented to a first direction parallel to the polymer material surface; and

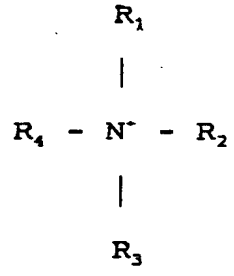
(ii) forming a mesostructured silica having tubular mesopores on the polymeric surface, the mesopores being filled with a surfactant and oriented towards a second direction nearly perpendicular to the first direction, by forming an oriented rod-like

surfactant micelle structure outside of which silica locates on the polymer material surface, the orientation of the rod-like surfactant micelle structure being determined by parallel accommodation of molecules of the surfactant on the chains of the polymer material through chemical interaction.

35. The process according to claim 34, wherein the surfactant is a cationic surfactant or nonionic surfactant.

36. The process according to claim 35, wherein the cationic surfactant is a quaternary alkylammonium salt.

37. The process according to claim 36, wherein the quaternary alkylammonium is represented by the following structural formula:



wherein R_1 to R_3 are independently a methyl group or ethyl group and R_4 is a C10 to C18 straight chained alkyl group.

38. The process according to claim 37, wherein R_4 is a C12 to C16 straight alkyl group.

39. The process according to claim 35, wherein the nonionic surfactant is an alkylamine or a surfactant containing or polyethylene oxide as a hydrophilic group.

40. The process according to claim 34, wherein the step (i) is a step of providing a Langmuir-Blodgett film of a polymer compound on a prescribed substrate.

41. The process according to any one of claims 34 to 40, wherein the polymer material is at least a polymer selected from the group consisting of polyethylene, nylon, polybutylene terephthalate, polyethylene terephthalate, polyester, polyimide and parylene polyparaxylilene.

42. The process according to claim 41, wherein the polymer material is polyimide.

43. The process according to claim 34, wherein the step (ii) is a step of hydrolyzing an alkoxysilane while the surface of the polymeric compound is in contact with a solution containing a surfactant and the alkoxysilane.

44. The process according to claim 34 further comprising a step of removing the surfactant in the mesopores.

45. The process according to claim 44, wherein the surfactant is removed by calcining the mesostructured silica obtained in the step (ii).

46. The process according to claim 44, wherein the surfactant is removed from mesostructured material obtained in the step (ii) by extracting with a solvent.

47. The process according to claim 44, wherein the surfactant is removed from the mesostructured material obtained in the step (ii) by critical fluid extraction.

48. A mesostructured material having tubular mesopores, the mesostructured material being arranged on a polymeric surface, wherein the tubular mesopores are oriented towards a prescribed direction parallel to the surface, the direction is determined by a direction of a rubbing treatment of the polymeric surface.

49. The mesostructured material according to claim 48, wherein the rubbing direction is identical with the prescribed direction.

50. A mesostructured material having tubular mesopores, the mesostructured material being arranged on a polymeric surface constituted of a polymeric compound, wherein the tubular mesopores are oriented towards a prescribed direction parallel to the surface, and the direction is determined by an orientation direction of the polymeric compound's polymer chain.

51. The mesostructured material according to claim 50, wherein the direction of the polymer chains' orientation and the prescribed direction are different from each other.

52. The mesostructured material according to claim 51, wherein the direction of the molecular chains' orientation and the prescribed direction are orthogonal each other.

53. A process for controlling an orientation of tubular mesopores of a mesostructured material comprising the step of hydrolyzing an alkoxide while a polymeric surface which has been rubbed, is in contact with a solution containing a surfactant and the alkoxide.

54. A process for controlling an orientation of tubular mesopores of a mesostructured material

comprising a step of hydrolyzing an alkoxide while a polymeric surface constituted of a polymeric compound whose polymer chains have been oriented towards a prescribed direction parallel to the polymeric surface, is in contact with a solution containing a surfactant and the alkoxide.